

299-E17-11 (A5883) Log Data Report

Borehole Information:

Borehole: 299-E17-11 (A5883)		Site: 216-A-36 Crib			
Coordinates (WA State Plane)		GWL (ft)¹: Not deep enough		GWL Date: 4/08/2003	
North	East	Drill Date	TOC² Elevation	Total Depth (ft)	Type
135,347.19 m	575,109.14 m	Feb. 1982	219.913 m	151.86	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	0.7	6 5/8	6	5/16	0	151
Welded steel	0	unknown	8	unknown	0	69.7
The logging engineer measured the 6-in. casing stick up using a steel tape. A caliper was used to determine the outside casing diameter. The caliper and inside casing diameter were measured using a steel tape. Measurements were rounded to the nearest 1/16 in. Casing thickness was calculated. The 8-in. casing was not observed on the ground surface but is reported in Ledgerwood (1993).						

Borehole Notes:

Borehole coordinates, elevation, and well construction information are from measurements by Stoller field personnel, HWIS³, and Ledgerwood (1993). Zero reference is the top of the 6-in. casing. A reference point survey "X" is located at the top of the casing stick up. The borehole was grouted (Chamness and Merz 1993).

Logging Equipment Information:

Logging System:	Gamma 2E	Type:	70% HPGe
Calibration Date:	10/2002	Calibration Reference:	GJO-2003-430-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Logging System:	Gamma 1C	Type:	High Rate Detector
Calibration Date:	02/07/02	Calibration Reference:	GJO-2003-429-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4/Repeat	
Date	4/08/03	4/08/03	4/14/03	4/14/03	
Logging Engineer	Pearson	Pearson	Pearson	Pearson	
Start Depth (ft)	151.0	66.0	46.0	80.0	
Finish Depth (ft)	65.0	45.0	1.0	65.0	
Count Time (sec)	50	100	100	50	

Log Run	1	2	3	4/Repeat	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	1.0	1.0	1.0	1.0	
ft/min	N/A ⁴	N/A	N/A	N/A	
Pre-Verification	BE015CAB	BE015CAB	BE020CAB	BE020CAB	
Start File	BE015000	BE015087	BE020000	BE020046	
Finish File	BE015086	BE015108	BE020045	BE020061	
Post-Verification	BE015CAA	BE015CAA	BE020CAA	BE020CAA	
Depth Return Error (in.)	N/A	0	0	0	
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	Repeat section.	

High Rate Logging System (HRLS) Log Run Information:

Log Run	1	2/Repeat			
Date	4/13/03	4/16/03			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	43.0	32.0			
Finish Depth (ft)	27.0	27.0			
Count Time (sec)	300	300			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	1.0	1.0			
ft/min	N/A	N/A			
Pre-Verification	AC063CAB	AC065CAB			
Start File	AC064000	AC065000			
Finish File	AC064016	AC065005			
Post-Verification	AC064CAA	AC066CAA			
Depth Return Error (in.)	0	0			
Comments	No fine-gain adjustment.	Repeat section.			

Logging Operation Notes:

Zero reference was top of the 6-in. casing. During logging, a centralizer was installed on the sonde.

Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (⁴⁰K, ²³⁸U, and ²³²Th) verifier with serial number 118.

HRLS data were collected using Gamma 1C. Pre- and post-survey verification measurements employed the ¹³⁷Cs verifier with serial number 1013.

Analysis Notes:

Analyst:	Sobczyk	Date:	04/21/03	Reference:	GJO-HGLP 1.6.3, Rev. 0
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SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day and compared to the control limits established on 4/10/2003. The verification spectra were all within the control limits. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectrum as compared to the pre-run verification spectrum for each day were between 2 percent lower and 3 percent higher at the end of the day.

HRLS pre-run and post-run verification spectra were collected at the beginning and end of the day. The spectra were within the acceptance criteria for the field verification of the Gamma 1C logging system (HRLS).

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source files: G2EMar03.xls and G1CApr03.xls). Zero reference was the top of the 6-in. casing. On the basis of Ledgerwood (1993), the casing configuration was assumed to be one string of 6-in. surface casing to total depth (151 ft) and one string of 8-in. casing to 69.7 ft. Casing correction factors were calculated assuming a total casing thickness of 0.635 in. from 0 to 69.7 ft and 0.3125 in. from 70 ft to 151 ft. The casing correction factor was calculated assuming a 6-in. casing thickness of 0.3125 in. and an 8-in. casing thickness of 0.322 in. The 6-in. casing thickness is based upon the field measurement, and the 8-in. casing thickness of 0.322 in. is the published value for ASTM schedule-40 steel pipe (a commonly used casing material at Hanford). Where more than one casing exists at a depth, the casing correction is additive (e.g., 0.322 in. + 0.3125 in. = 0.635 in. would be the combined thickness for the 6-in. and 8-in. casings). A water correction was not required.

Using the SGLS, dead time greater than 40 percent was encountered in the intervals from 28 to 35 ft, 39 to 42 ft, and at 54 ft. The HRLS was utilized to obtain data where the SGLS dead time exceeded 40 percent.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K , ^{238}U , and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs and ^{60}Co were the man-made radionuclides detected in this borehole. ^{137}Cs was detected near the ground surface (3 to 8 ft) at concentrations ranging from 0.3 to 1.2 pCi/g. ^{137}Cs was detected in the interval at log depths between 26 and 95 ft. The range of concentrations was from 0.4 pCi/g to 120,000 pCi/g, which was measured at 30 ft. ^{137}Cs was also detected near the MDL (0.2 pCi/g) at 125 ft, 135 ft, and 143 ft. ^{60}Co was detected in the intervals at log depths between 36 to 51 ft, 71 to 93 ft, and at 65 ft. The range of concentrations was from 0.2 pCi/g to 1.5 pCi/g, which was measured at 81 ft.

Recognizable changes in the KUT logs occurred in this borehole. Changes of about 5 pCi/g in apparent ^{40}K concentrations occur at 4 ft and between 28 through 39 ft. ^{40}K concentration decrease at about 4 ft, which

corresponds with the base of the backfill (Ledgerwood 1993). The increase in ^{40}K activities between 28 and 39 ft may represent the transition from the coarse-grained sediments to finer grained sediments.

In the repeat logs, the SGLS showed reasonable repeatability for the natural radionuclides (609, 1461, 1764, and 2614 keV) and man-made radionuclides except for low-levels of ^{60}Co . This variation is attributed to the short counting time of 50 s. The plot of the HRLS repeat log demonstrates good repeatability of the HRLS data for ^{137}Cs (662 keV).

References:

Ledgerwood, R.K., 1993. *Summaries of Well Construction Data and Field Observations for Existing 200-East Resource Protection Wells*, WHC-SD-ER-TI-007, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

¹ GWL – groundwater level

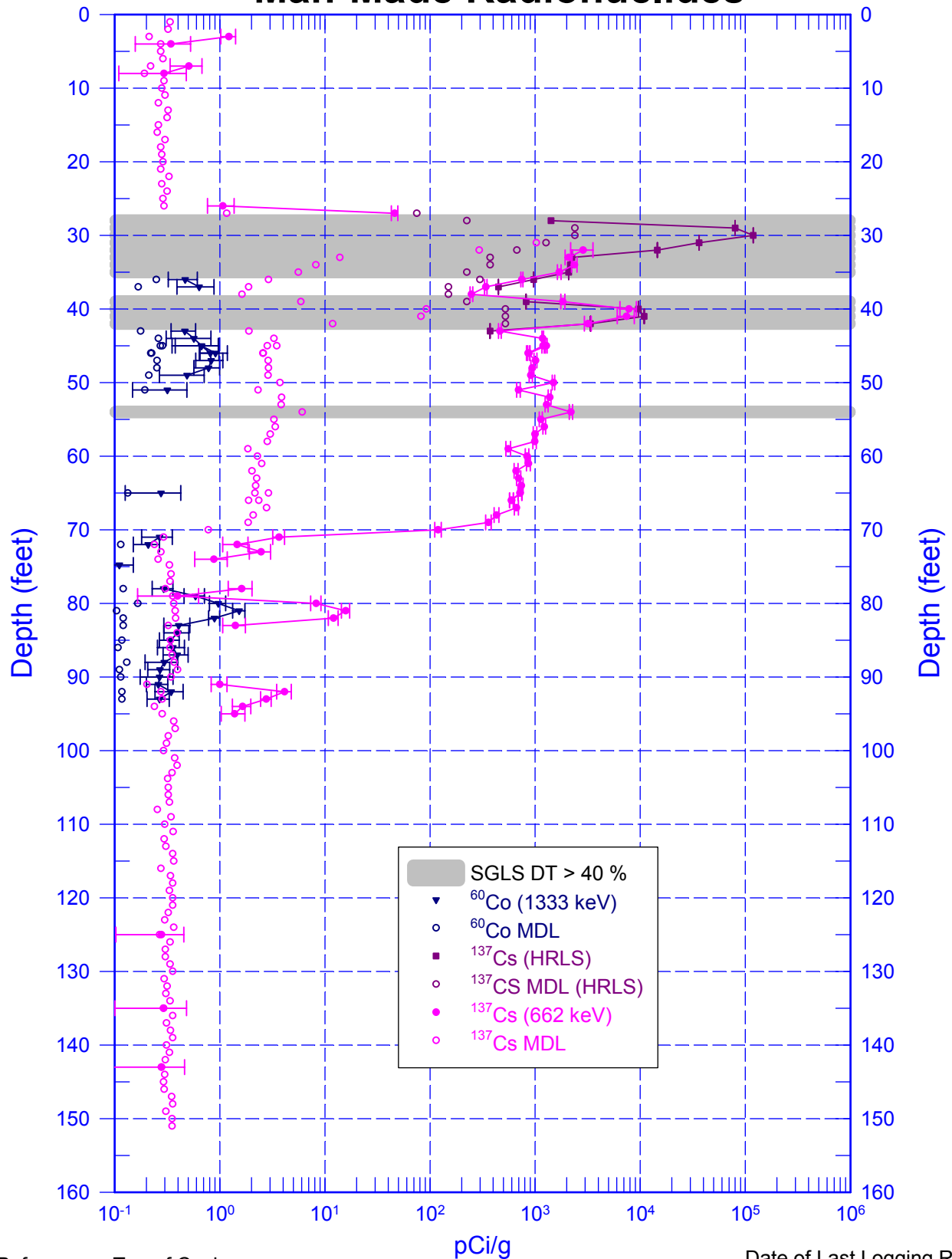
² TOC – top of casing

³ HWIS – Hanford Well Information System

⁴ N/A – not applicable

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Man-Made Radionuclides

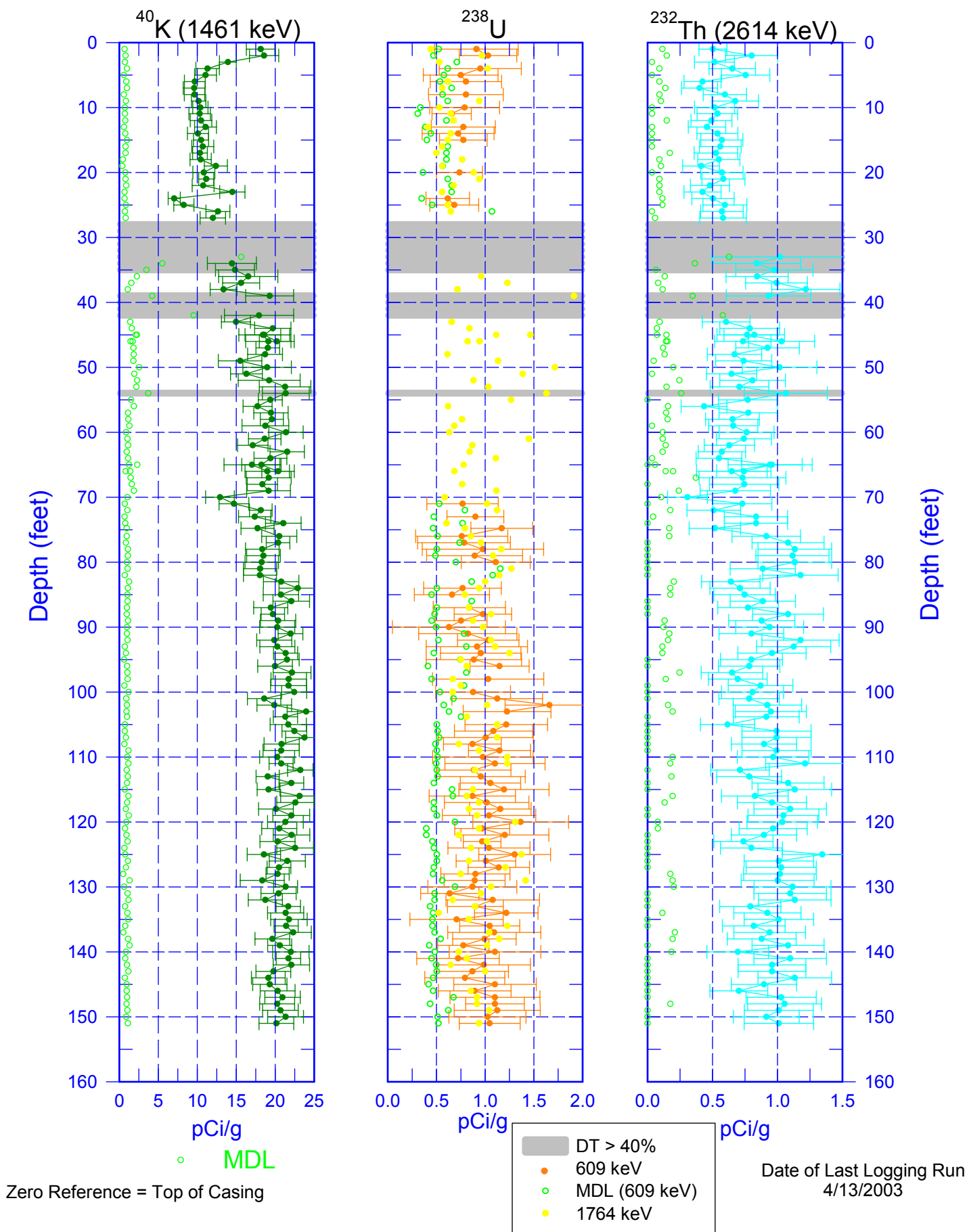


Zero Reference = Top of Casing

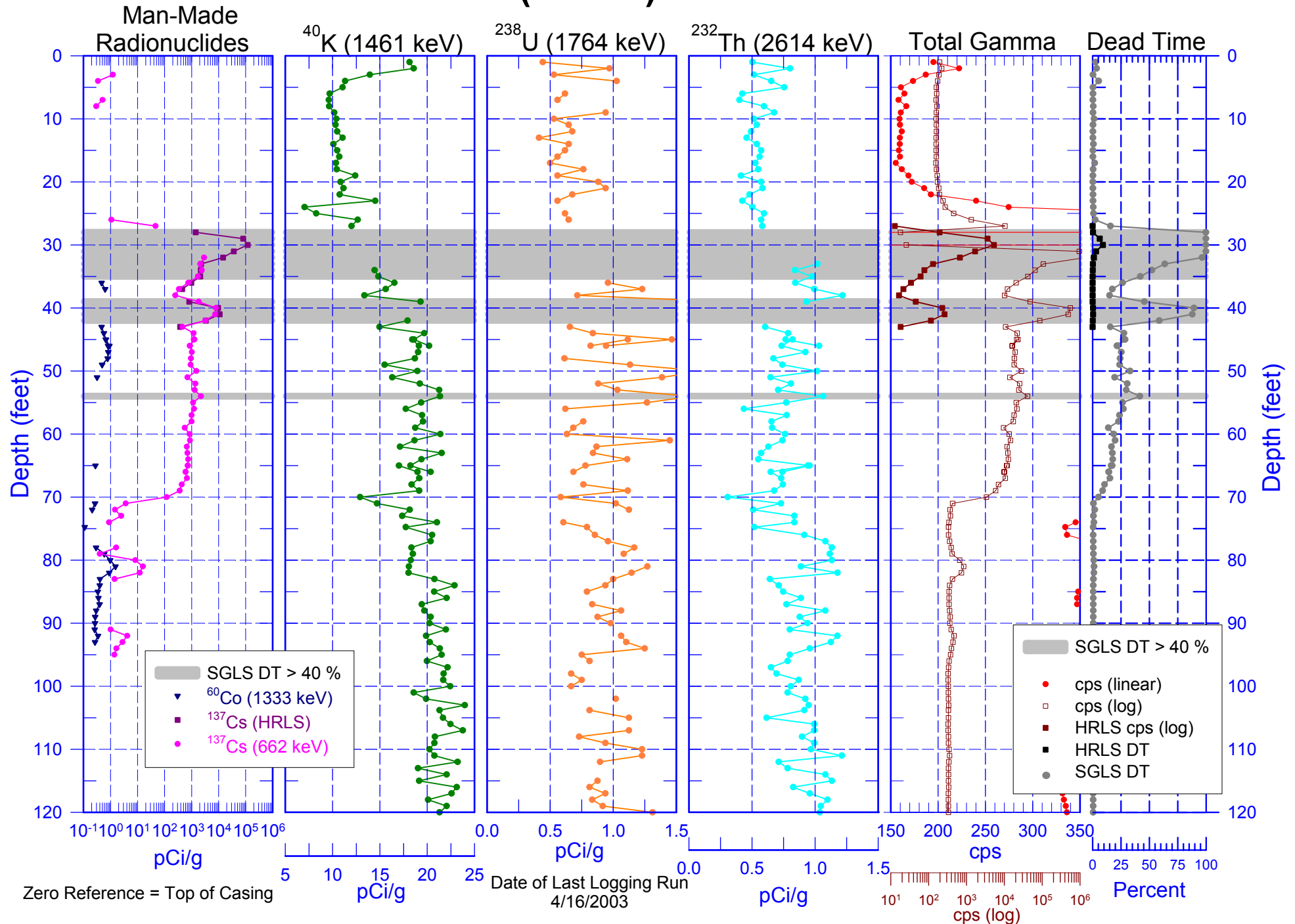
Date of Last Logging Run
4/16/2003

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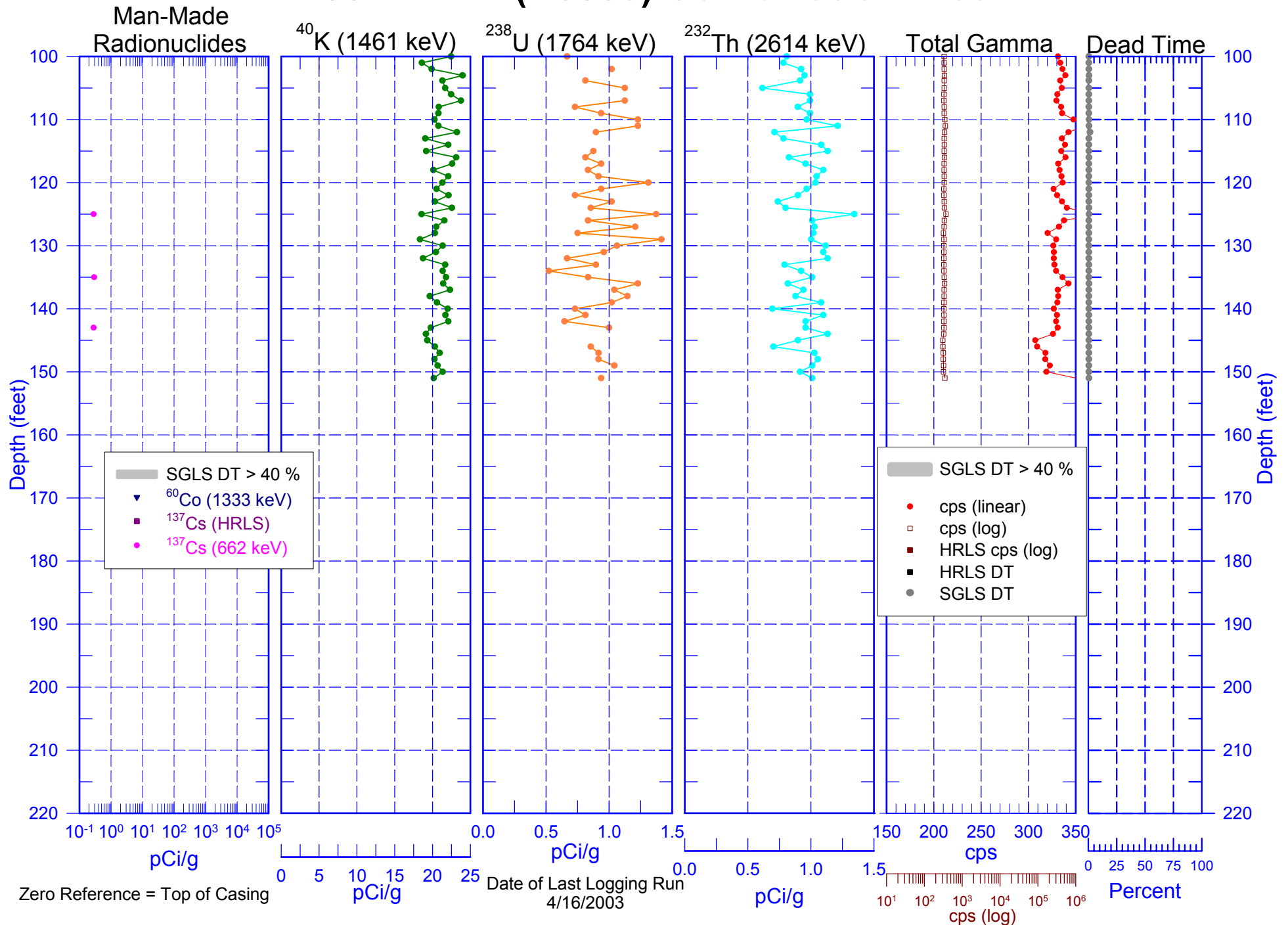
Natural Gamma Logs



299-E17-11 (A5883) Combination Plot

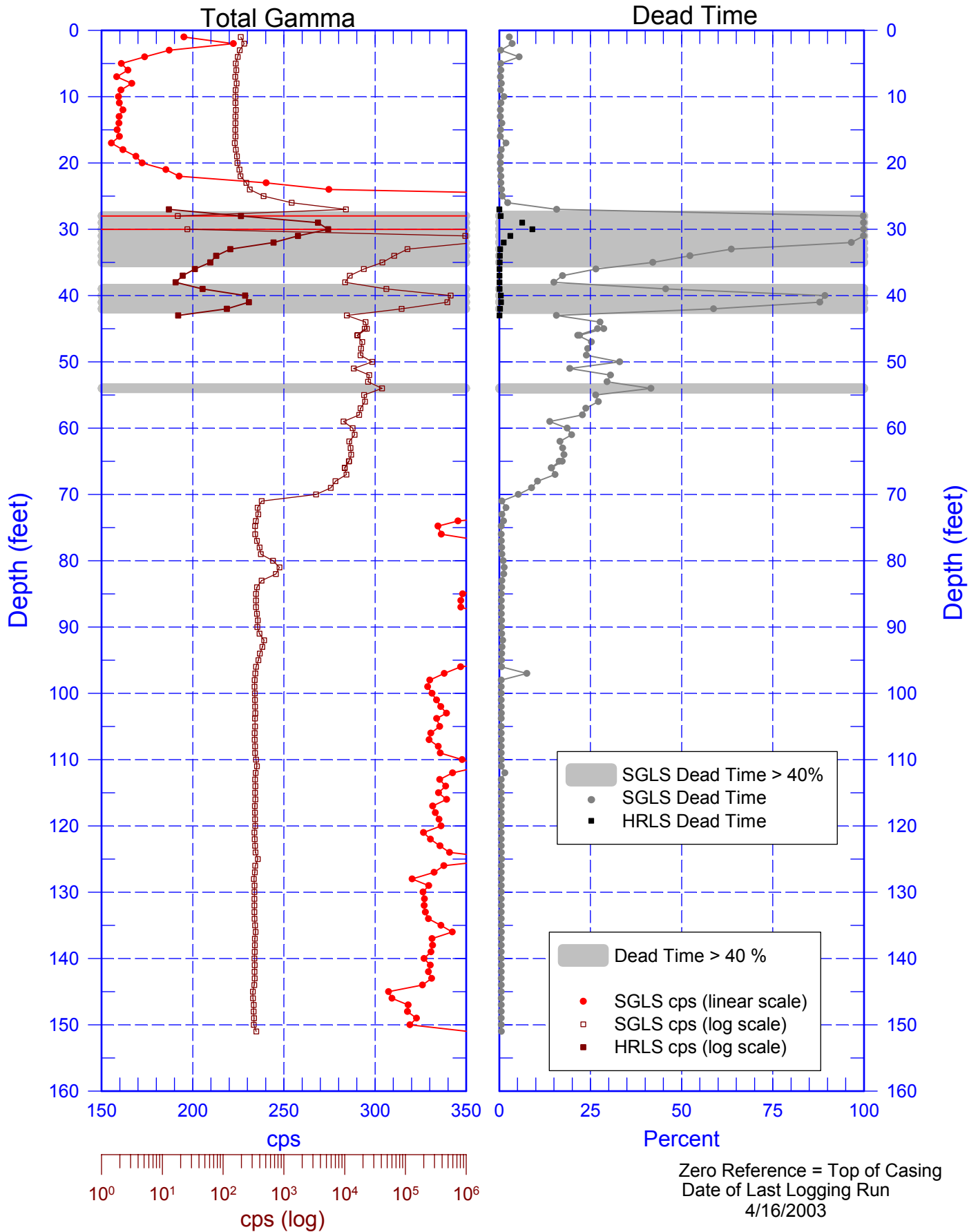


299-E17-11 (A5883) Combination Plot



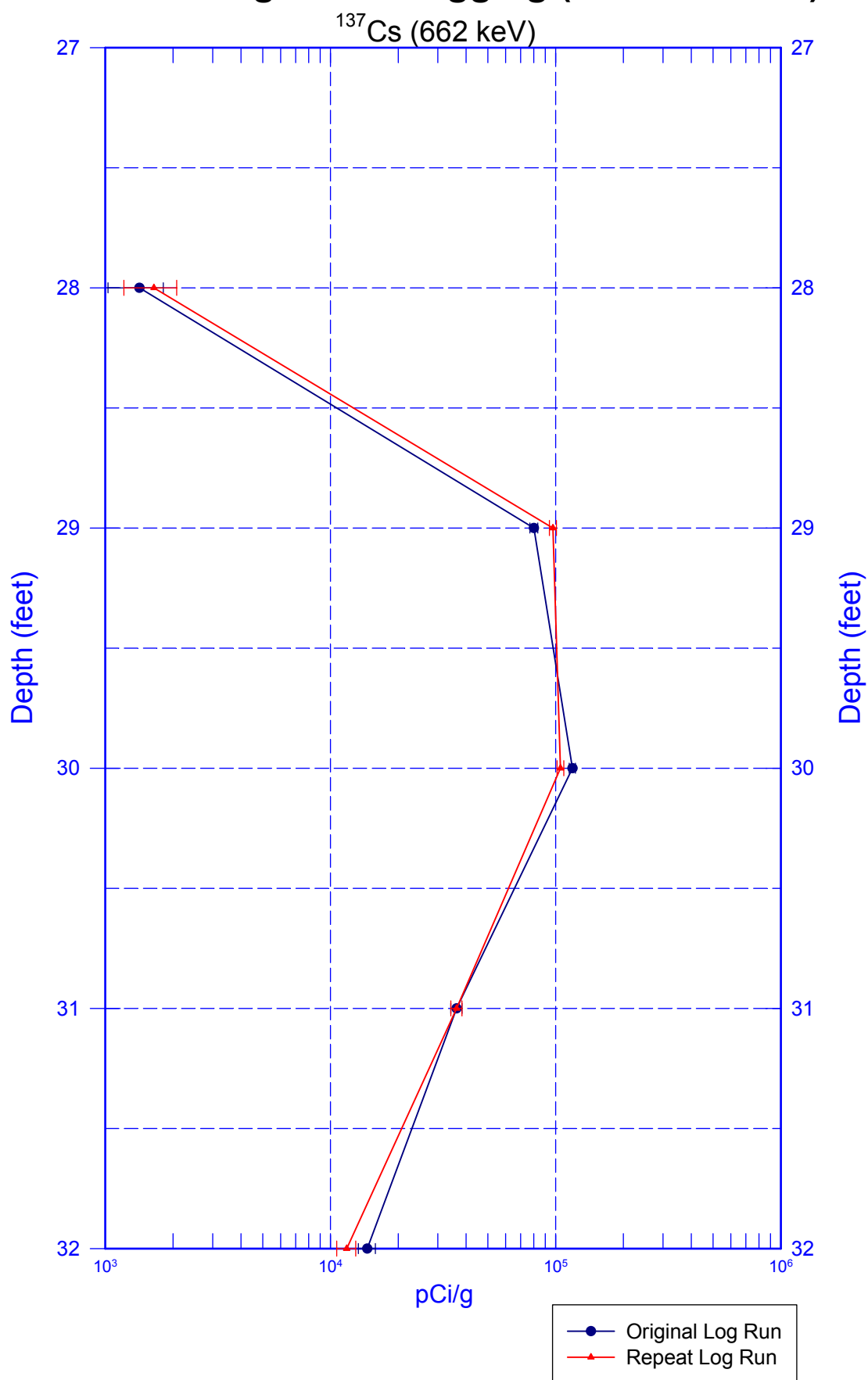
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Total Gamma & Dead Time



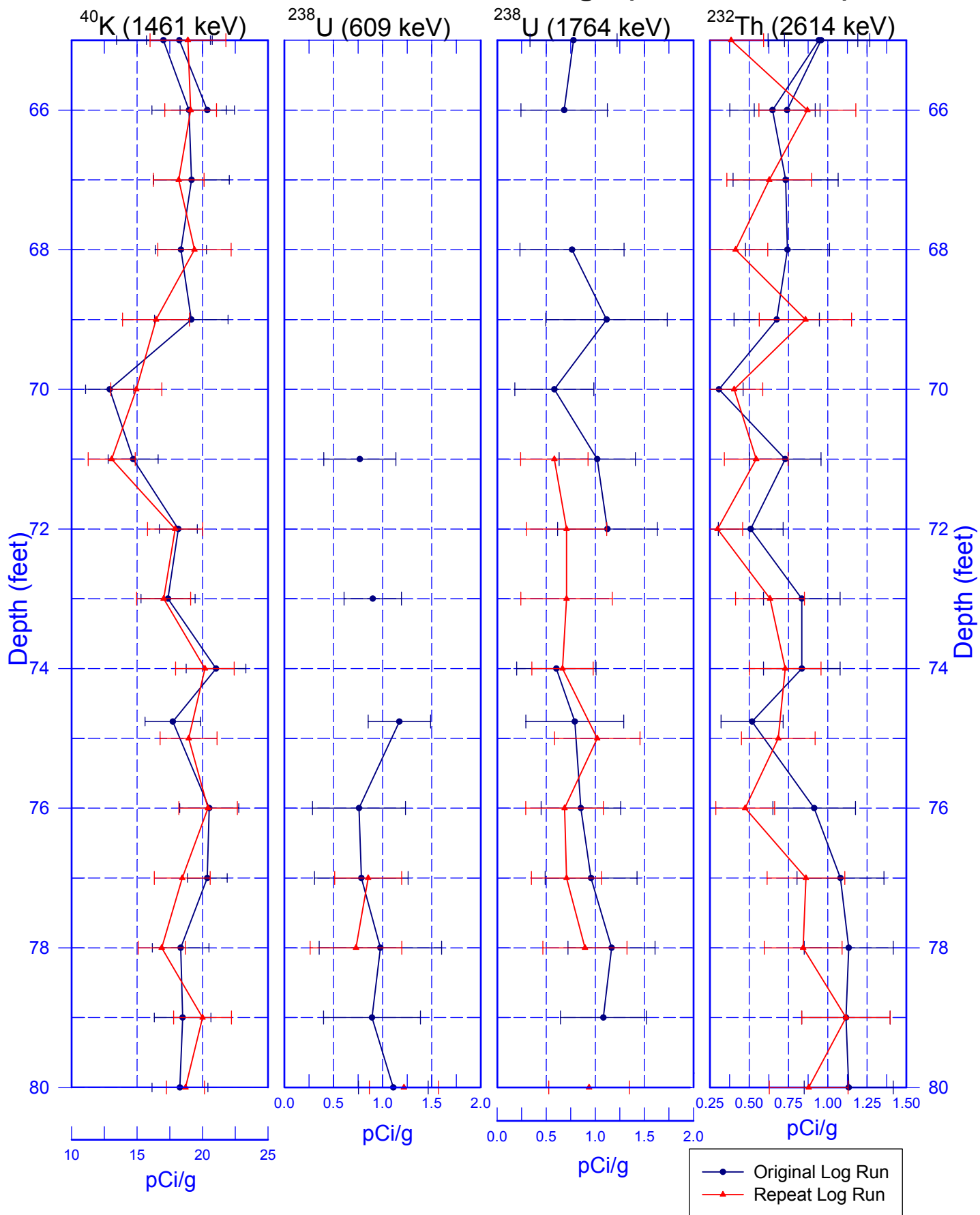
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Rerun of High Rate Logging (32.0 to 27.0 ft)



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Rerun of Natural Gamma Logs (80.0 to 65.0 ft)



299-E17-11 (A5883)

Rerun of Man-Made Radionuclides (80.0 to 65.0 ft)

